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Distinguishing characters of *Hemigenia rigida*, a conservation significant species confused with *H. pritzelii* (Lamiaceae: Westringieae)

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Abstract

Guerin, G.R. Distinguishing characters of *Hemigenia rigida*, a conservation significant species confused with *H. pritzelii* (Lamiaceae: Westringieae). *Nuytsia* 23: 467–474 (2013). *Hemigenia rigida* Benth. (sect. *Homalochilus* Benth.) is a species of high conservation concern from Western Australia's Avon Wheatbelt known from three collections made 150 and 20 years apart. *Hemigenia pritzelii* S.Moore (also sect. *Homalochilus*), a more frequent species from the Jarrah Forest of south-west Western Australia, has been frequently confused with *H. rigida* and both were previously confused with *H. ramosissima* Benth. The mis-application of the name *H. rigida* to the distinct and more abundant species *H. pritzelii* has hampered recognition of the potentially dire conservation status of *H. rigida*. To resolve longstanding confusion, distinguishing characters are provided for *H. pritzelii* and *H. rigida* along with morphological descriptions, distribution maps and information on ecology. An interim key to the species of sect. *Homalochilus* is presented for context and to aid identification.

Introduction

Hemigenia rigida Benth. has only been collected three times in over 150 years from a limited geographic area, which suggests that it may meet the IUCN (2001) criteria for Critically Endangered. It was described from a Drummond collection (Bentham 1848) 54 years before another taxon of *Hemigenia* R.Br. sect. *Homalochilus* Benth., *H. pritzelii* S.Moore (Moore 1902). These two species are morphologically similar because they have opposite leaves, pedicellate flowers and calyces with reduced lateral lobes on the adaxial lip. Confusion among species of sect. *Homalochilus* arose with the treatment of both *H. rigida* and *H. pritzelii* under *H. ramosissima* Benth. (which is listed as Critically Endangered under the *EPBC Act*) in *Flora of the Perth region* (Marchant *et al.* 1987). This synonymy was erroneous and only *H. pritzelii* is known to occur in the Perth region. *Hemigenia ramosissima* is distinct from *H. pritzelii* and *H. rigida* (see key and notes below) and is now correctly recognised as such at the Western Australian Herbarium. However, the name *H. rigida* has since been commonly misapplied to the much more abundant *H. pritzelii*, while *H. rigida s. str.* has continued to be recognised as poorly known (Marchant & Keighery 1979; Smith 2012). A high conservation concern and the constant confusion with a similar, abundant taxon underscores the importance of a better taxonomic understanding of *H. rigida*.

Hemigenia sect. *Homalochilus* has not been revised since its circumscription by Bentham (1870), who recognised four species: *H. macphersonii* Luehm., *H. macrantha* F.Muell., *H. ramossisima* and

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H. rigida. It now also includes *H. pritzelii*, and four other putative undescribed species (see key below). As is typical of most *Hemigenia* species, all members of sect. *Homalochilus* (excluding *H. macrantha*) have four anthers with the thecae of each individual anther separated (or the lower theca aborted) by expanded connective tissue, forming a versatile lever-like structure (Guerin 2005). However, sect. *Homalochilus* is distinguished from the rest of *Hemigenia* by strongly zygomorphic, two-lipped calyces composed of reduced lobes, or fused lobes, or both (Guerin 2008a). *Hemigenia macrantha* does not appear to be closely related to any of the other species in sect. *Homalochilus* since it was placed in a separate clade on molecular data (Guerin 2008b). While *H. macrantha* is included here in the key to species for convenience of identification, the phylogenetic data suggest that a revised classification of the section will be required in addition to the treatment of the aforementioned undescribed species.

This paper provides distinguishing characters for *H. pritzelii* and *H. rigida* within an interim key to the species of sect. *Homalochilus* for context (pending completion of a revised classification and description of new species) along with morphological descriptions, distribution maps and information on ecology. Descriptions are based on herbarium collections from AD, CANB, MEL, NSW and PERTH. All floral characters in the key to species refer to fully developed flowers rather than bud or fruiting stages in which proportions may differ. The conservation status of *H. rigida* and its confusion with other species warrant immediate publication of this information within the context of sect. *Homalochilus* prior to publication of a more comprehensive revision.

Interim key to the species of *Hemigenia* sect. *Homalochilus* with a focus on distinguishing *H. pritzelii* and *H. rigida*

1. Leaves opposite

2. Adaxial lip of calyx distinctly 3-lobed ..... **H. sp. Newdegate**
(also keyed below, leaves usually 3-whorled)

2: Adaxial lip of calyx entire or with reduced and inconspicuous lateral lobes

3. Indumentum dense throughout (excluding corolla), hairs stellate; flowers not pedicellate ..... **H. macrantha**

3: Indumentum absent or sparse, hairs simple; flowers pedicellate

4. Pedicels 9–20 mm long; bracteoles lanceolate or ovate with an abruptly acuminate, tapering apex, 5–9 mm long, nearly equalling or exceeding the calyx tube, often enclosing the calyx and conspicuous; calyx 7.5–10 mm long, the lips conspicuously but not deeply divided (less than half length of calyx), adaxial lip broadly ovate with an abruptly acuminate apex, not becoming recurved nor significantly inflated in fruit ..... **H. rigida**

4: Pedicels 4.5–6 mm long; bracteoles narrowly linear-subulate, 2–4 mm long, often not exceeding the calyx tube, erect but inconspicuous; calyx 4–6 mm long, the lips deeply divided (about half length of calyx), adaxial lip broadly rounded with a small apiculate apex, becoming inflated and recurved in fruit ..... **H. pritzelii**

1: Leaves in whorls of three

5. Flowers distinctly pedicellate, pedicels longer than calyx

6. Stems and calyces sparsely pubescent with long, septate hairs, stems also shortly pubescent beneath; adaxial lip of calyx entire ..... **H. sp. Three Springs**

6: Stems shortly pubescent, mainly in the grooves, or nearly glabrous, calyces more or less glabrous; adaxial lip of calyx shortly but distinctly 3-lobed

7. Leaves linear to narrowly elliptic, flat ..... **H. ramosissima**

7: Leaves narrowly linear-terete ..... **H. sp. Gibson**

5: Flowers sessile or shortly pedicellate, pedicels not longer than calyx

8. Leaves narrowly linear, >20 mm long (usually >>20mm)

9. Corolla tube distinctly exserted from calyx; abaxial lip of calyx less than half the length of the adaxial lip ..... **H. macphersonii**

9: Corolla tube not exserted from calyx; abaxial lip of calyx more than half the length of the adaxial lip ..... **H. sp. Yuna**

8: Leaves broader than narrowly linear (linear to narrowly elliptic or lanceolate), <15 mm long

10. Plants more or less glabrous; flowers ± sessile; calyx lips entire and rounded ..... **H. microphylla**

10: Stems (sometimes also leaves, pedicels, bracteoles and calyces) shortly hispid; flowers shortly pedicellate; adaxial calyx lip distinctly 3-lobed ..... **H. sp. Newdegate**

Taxonomy

Hemigenia rigida Benth., in DC. *Prodr.* 12: 565 (1848). Benth., *Fl. Austral.* 5: 112 (1870).

Type: [Western Australia, 1844–1847], *J. Drummond* 146 [4th Collection] (*syn*: MEL 646638!, MEL 646639!, PERTH 03852466!).

Hemigenia ramosissima auct. non Benth.: N.G. Marchant, J.R. Wheeler, B.L. Rye, E.M. Bennett, N.S. Lander & T.D. Macfarlane, *Fl. Perth Region* 1: 560 (1987), *p.p.*

Prostrate or open *shrubs*; *branchlets* with sparse, scattered, minute hairs all over. *Leaves* opposite, sessile, mostly patent, straight, glabrous or with sparse, minute, appressed hairs; lamina flat or the margins slightly incurved, oblanceolate, 14 × 2 mm to 28 × 5 mm; base long-tapering; apex obtuse and often shortly, sharply apiculate. *Pedicels* 9–20 mm long, glabrous, persistent on plants between years; *bracteoles* inserted immediately below the calyx, erect and usually enclosing the calyx, nearly equal to or longer than the calyx tube, ovate to lanceolate with an ± abruptly acuminate, tapering apex, 5–9 mm long, sparsely ciliate or with sparse, minute hairs on the surface. *Calyx* sparsely ciliate and sometimes with sparse, sessile glands on the surface of the lobes, 7.5–10 mm long, not significantly inflating at fruiting stage; tube obtriangular and slightly ribbed; adaxial and abaxial lips conspicuously but not deeply divided (less than half the length of the calyx), the abaxial lip deltoid with a deep sinus and acute, triangular lobes, the adaxial lip broadly ovate with an abruptly acuminate, tapering apex, with indistinct lateral lobes, not erect or becoming recurved or significantly inflated in fruiting stage. *Corolla* 10–17 mm long, purple or pink; exterior surface mostly glabrous; interior not seen due to limited material; abaxial median lobe spade-shaped, deeply lobed, 3–5 mm long; lateral lobes obtrullate, 2–5 mm long; adaxial median lobe pair emarginate, 3–4 mm long. (Figures 1; 2B, D)

Other specimens examined. WESTERN AUSTRALIA: [localities withheld for conservation reasons] 10 Nov. 1992, *F.H. Mollemans* 4272 *& M.P. Mollemans* (AD, CANB, NSW, PERTH); 16 Oct. 2012, *WA Herbarium* WAH 538 (AD, PERTH).

Distribution and habitat. Currently known only from two locations near the south-west margin of the Avon Wheatbelt region of south-west Western Australia (Figure 3). Recorded on grey-buff sand with surface scatter of lateritic gravel in *Eremaea pauciflora* mixed scrub and heath. Also recorded on gravelly soil in eucalypt woodland.

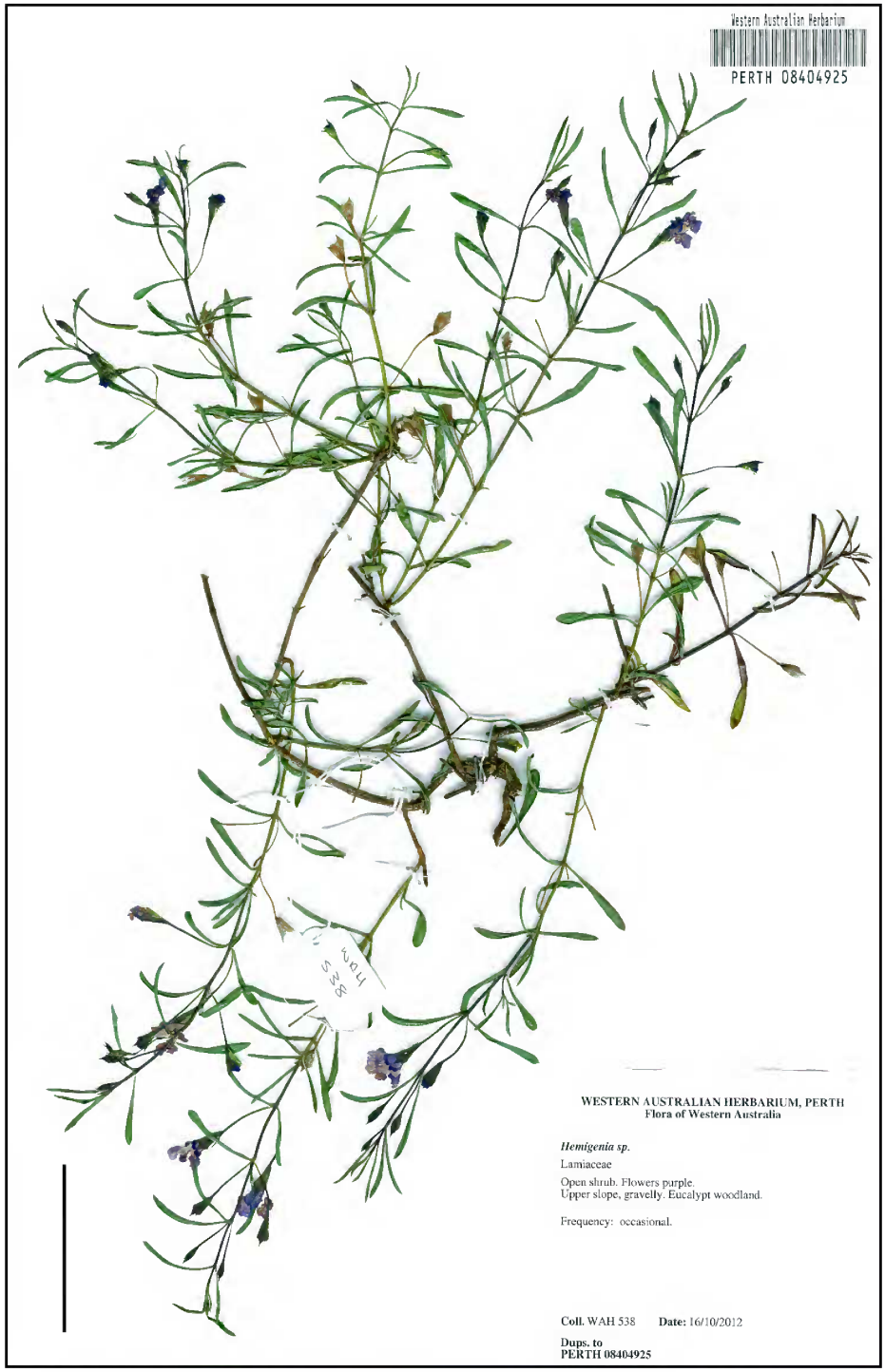

Figure 1. Scanned image of the 2012 collection of *Hemigenia rigida*. Image from *WA Herbarium* WAH 538 c/o Western Australian Herbarium curatorial staff. Scale bar = 5 cm.

Figure 2. *Hemigenia pritzelii* and *H. rigida*. A – *H. pritzelii* flowering shoot showing relatively shorter pedicels and calyces and narrowly linear bracteoles; B – *H. rigida* flowering shoot showing relatively longer pedicels and calyces and ovate bracteoles with an abruptly acuminate apex; C – *H. pritzelii* post-fruiting calyces, showing rounded adaxial lip (beneath) deeply divided from abaxial lip (above); D – *H. rigida* post-fruiting calyces showing more elongated tube and abruptly acuminate adaxial lip more weakly divided from abaxial lip. Scale bars = 10 mm. Images from *B.J. Lepschi & T.R. Lally* 2382 (PERTH) (A), *F.H. Mollemans* 4272 *& M.P. Mollemans* (PERTH) (B), *N. Cason & B. Evans* SC 137.8 (PERTH) (C) and *J. Drummond* 4th Collection, no. 146 (PERTH syntype) (D). Photographs by G.R. Guerin.

Conservation status. Listed as Priority One under the Department of Environment and Conservation's (now Department of Parks and Wildlife) Conservation Codes for Western Australian Flora (Smith 2012). There are only three confirmed collections of *H. rigida*, that of James Drummond in the early 19th Century followed almost 150 years later by a collection in 1992, with one subsequent collection in 2012. Given that the two most recent collections have been made in reasonably well-collected areas with highly fragmented vegetation, it seems likely that this species warrants listing as Critically Endangered.

Typification. Both MEL Drummond specimens cited above were annotated by Bentham. MEL 646638 is a mixed collection with two pieces of *H. rigida* on either side of a smaller specimen of another species. The additional species is quite likely a *Hemigenia* from a different section (the calyces are more or less actinomorphic and distinctly lobed). As I have not seen a duplicate that may be held at K, I do not lectotypify herein.

Affinities and notes. Hemigenia rigida has been confused in the past with *H. ramosissima* and more recently with *H. pritzelii*. *Hemigenia rigida* and *H. pritzelii* can be distinguished from *H. ramosissima* by their opposite rather than 3-whorled leaves and 1-lobed rather than shortly 3-lobed adaxial calyx lips. *Hemigenia rigida* can be distinguished from *H. pritzelii* by the longer pedicels, calyx and bracteoles. The bracteoles are lanceolate or ovate rather than linear-subulate and the apex of the adaxial calyx lip is abruptly acuminate rather than apiculate as in *H. pritzelii*.

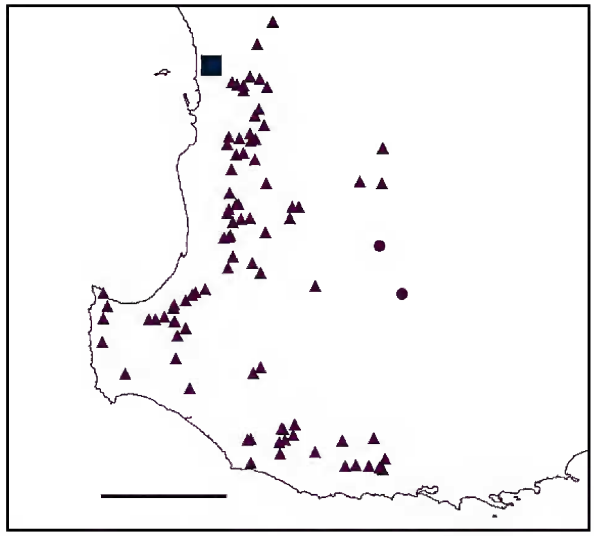

Figure 3. Distribution of *Hemigenia pritzelii* (triangles) and *H. rigida* (circles) in south-west Western Australia based on data for herbarium collections held at the Western Australian Herbarium. Square: location of PERTH. Scale bar = 200 km.

Hemigenia pritzelii S.Moore, *J. Bot.* 40: 28 (1902).

Type: 'District Wellington: in silvis umbrosis montium Darling Range', Western Australia, 1901, *E. Pritzel* 196 (*holo*: BM *n.v.*; *iso*: AD 96933374!, NSW 433503!).

Hemigenia rigida auct. non Benth.: G. Paczkowska & A.R. Chapman, *West. Austral. Fl.: Descr. Cat.* 272 (2000), *p.p.*; J.R. Wheeler, N. Marchant & M. Lewington, *Fl. South West* 2: 644 (2002).

Hemigenia ramosissima auct. non Benth.: N.G. Marchant, J.R. Wheeler, B.L. Rye, E.M. Bennett, N.S. Lander & T.D. Macfarlane, *Fl. Perth Region* 1: 560 (1987), *p.p.*

Erect or spreading to prostrate, compact to open *herbs*, *sub-shrubs* or *shrubs* 0.1–0.7 m high; *branches* mostly glabrous but young stems often puberulent inside the grooves. *Leaves* opposite, sessile, erect, patent or reflexed, straight to slightly recurved towards the apex or sometimes recurved along the entire length, glabrous; lamina folded and linear to oblanceolate, or open and elliptic or obovate, 8 × 1 mm to 35 × 10 mm; base tapering; apex obtuse and often slightly apiculate, appearing acute when folded. *Pedicels* 4.5–6 mm long, sparsely puberulent, more so towards the base, persistent on plants between years; *bracteoles* inserted shortly below the calyx, erect, usually shorter than the calyx tube, narrowly linear-subulate, 2–4 mm long, glabrous. *Calyx* glabrous other than some cilia, 3.7–6 mm long, inflating and becoming rigid (and persistent) at fruiting stage; tube obtriangular to cup-shaped and lightly ribbed; adaxial and abaxial lips deeply divided (to about half the length of the calyx), the abaxial lip deltoid with a short sinus and acute, triangular lobes, the adaxial lip broadly rounded, the lateral lobes indistinct, apex rounded to obtuse but with a short, sharp tip, erect and becoming strongly recurved and inflated in fruiting stage. *Corolla* 5.1–12 mm long, (± pale) purple or pink, throat white with coloured spots; exterior surface glabrous except for the ciliate lobes; interior surface lightly

bearded between the filaments; abaxial median lobe shortly spade-shaped, 2.5 mm long; lateral lobes obovate, 1.5–3 mm long; adaxial median lobe pair broadly rounded and deeply emarginate, the lobes flat, 1.5 mm long. (Figure 2A, C)

Selected specimens examined. WESTERN AUSTRALIA: off Boronia Rd, 950 m E from Mountain Rd, creek between Pts 4261 and 4231, 28 Nov. 1990, *A.R. Annels* 1398 (PERTH); Break Rd, 100 m E of Forth River, 28 Nov. 1994, *A.R. Annels & R.W. Hearn* 5039 (PERTH); near Pt 4231 Boronia Rd, 1 km E of Mountain Rd, 200 m N of road on edge of granite outcrop, 30 Nov. 1994, *A.R. Annels & R.W. Hearn* 5069 (PERTH); Deeside Coast Rd, 300 m from turnoff off main road, E of Northcliffe, 4 Feb. 1997, *R.J. Cranfield* 10866 (PERTH); Collie Rd South, 29 Oct. 1997, *R.J. Cranfield* 11477 (PERTH); under power line *c.* 1.5 km SE of Gibbs Rd, SSW of Cordering, 20 Oct. 1993, *V. Crowley* DKN 702 (PERTH); Shire of Denmark, Kent River crossing, Break Rd western side of river, in shrubland above granite (*c.* 30 m from roadside), 18 Oct. 2003, *G.R. Guerin* 116 *& P.A. McLachlan* (AD); along power lines along the Roelands/Lake King Rd W of Collie, 20 Dec. 1994, *E.D. Kabay* 1285 (PERTH); Site 28, 10 km SSE of Canning Dam, bearing WNW, 28 July 1997, *M.J. Kealley* 258 (PERTH); Site 39, 5 km WSW of Mt Solus, bearing SW, 31 July 1997, *M.J. Kealley* 592 (PERTH); Site 40, 6.5 km SSW of Mt Solus, bearing ESE, 4 Aug. 1997, *M.J. Kealley* 811 (PERTH); Sandalwood Rd, 4 km S of Mornington Mills, SE of Harvey, 16 Oct. 1997, *T.R. Lally & B. Fuhrer* TRL 1504 (PERTH); Collie basin, on spoils at Wallsend, 9 Nov. 1979, *J. Koch* CJK21 (PERTH); Site B51, 200 m SW of corner 500 m along unnamed track which intersects with Samson Brook Dam track, 1.1 km S of intersection with W boundary road, bearing SW, 23 July 1997, *G. Paull* 200 (PERTH); Site B52, Merizzi Rd, 1 km SE from intersection with Waterous Form Rd, S boundary of site, 20 m N of Merizzi Rd, bearing NE, 25 July 1997, *G. Paull* 374 (PERTH); Big Brook near Bramley, on Bussell Hwy N of Margaret River, 6 July 1974, *R. Pullen* 9866 (NSW); Dryandra State Forest, Crossman map 1:100,000 Grid Reference 903734, 17 Nov. 1987, *D.M. Rose* 514 (PERTH).

Distribution and habitat. Occurs in the Jarrah Forest and Warren regions of south-west Western Australia (Figure 3). Frequent on a wide range of soils (sand, clay and gravel) and landscape positions but often associated with granite outcrops or wetlands. Occurs in a range of forest, woodland and heath communities, most commonly in association with *Eucalyptus marginata* and *Corymbia calophylla*.

Conservation status. Not considered to be of conservation concern.

Typification. Duplicates of *E. Pritzel* 196 were originally determined as *H. rigida.* The isotypes seen from AD and NSW were not annotated/seen by Moore.

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